Important Notice for Servicing Monitors

●General Notice :

This service manual is prepared to assist service organizations or engineers who are in charge of servicing monitors in the field. This manual, therefore, is not for end users but for those technically oriented service engineers from distributors, dealers, VARs and other wholesalers or retailers who are capable of servicing the unit.

This manual explains the monitor's outline, detailed features, functions, basic construction of the individual unit and the circuits, sophisticated adjustments and detailed troubleshooting procedures for NANAO monitors.

Please read and understand this manual before attempting service.

This manual uses the following conventions.

⚠DANGER
It indicates a potentially hazardous situation which, if not avoided, will result in death or serious injury.

⚠WARNING
It indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠CAUTION
It indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury and/or property-damage.

It indicates a prohibited action.

It indicates a general caution.

It indicates a caution which, if not avoided, may result in electric shock.

⚠DANGER

1) The monitor contains high voltage circuit. Only experienced service personnel should perform repairs or service work on high voltage monitors.

   When the cabinet of the monitor is removed and the monitor is operating, there is a risk of an electric shock hazard.

2) When designing and manufacturing the equipment or the product by using the monitor, realize the monitor feature and consider the safety.

3) Never modify any part of the equipment without permission by authorized party.

   NANAO corporation will not be responsible for any damage or incident caused by an unauthorized modification.

⚠WARNING

1) Unplug the power cord before servicing.

   Ensure the power cord is disconnected before replacing any parts in the unit. There is a risk of the electric shock hazard or damage.

2) Do not wear any metal or accessories.

   There is a risk of an electric shock.

●Precautions for Servicing :

1. General

⚠WARNING

1) Do not connect or disconnect any wires or connectors while the monitor is in operation.

It may result in damage to the circuit or may cause an electric shock.

2) Do not short any portion of any circuit while the monitor is in operation.

This will cause smoke, electric shock or damage to the transistors, ICs or other parts or circuit in the unit. (*Excluding the Adjustments only when specified.)

3) Do not change the original design of the monitor.

This will cause smoke, electric shock or damage to the circuit.

4) Replace only with the exact factory recommended spare parts.

The use of unauthorized substitute parts may cause an electric shock, damage to the monitor, or may exceed the specified X-ray radiation.

- •Safety related parts Parts List : "S" Circuit Diagram : "⚠"
- •X-ray related parts Parts List : "X" Circuit Diagram : "★"
- •Anti-static related parts Parts List : "A"
- •Moisture protection related parts Parts List : "M"

⚠CAUTION

1) Do not touch the sharp edge of the chassis.

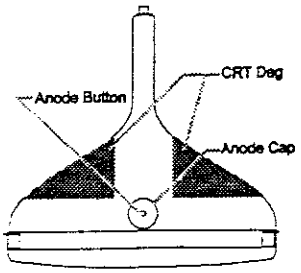
It may result in injury.

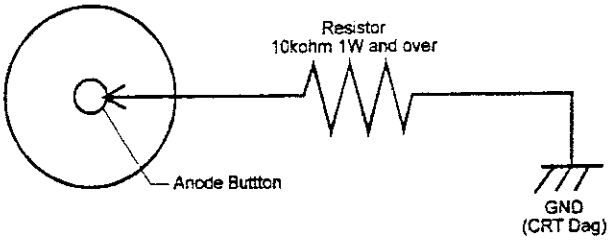
2. Precautions for Servicing CRT

⚠ WARNING

1) **Disconnect the Power Cord, and completely remove static charge before taking off the Anode Cap.**

When discharging high voltage, be sure to disconnect the power cord.
Connect a 10kΩ resistor (1W and over) and a insulator wire(such as a test probe) between CRT dag and the Anode Button.
If the High Voltage is not removed, you will get an electric shock by touching the Anode Cap area.





2) **Replace with a CRT of the same type number for continued safety.**

The CRT used in this monitor employs integral implosion protection.
If the CRT is replaced with a different type, it will result in an improper circuit function, exceed the specified Safety Standards range, or affect the picture quality guaranteed in the specifications.

3) **Use only CRT and PCB cording the same serial number.**

Apply silicon grease around anode button when putting anode cap on. Please make sure that only other material is not attached around contact area.

4) **Pay your attention to CRT neck and PCB-CRT. Do not touch them to the other material.**

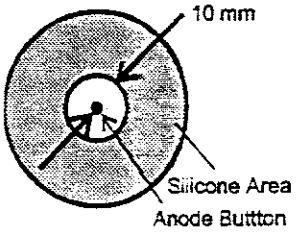
This will cause the damage.

5) **Follow the instructions below when mounting the Anode cap.**

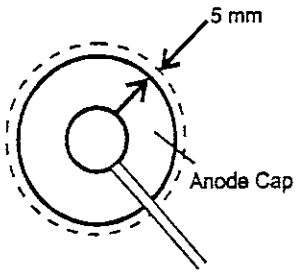
Surely mount the Anode cap and paint the silicone grease. High voltage may leak from the Anode cap and there is a risk of electric shock and damage.

(1) Clean up around the Anode button and inside of the Anode cap.

(2) Paint the Silicone grease equally around the Anode cap with a paint-brush. (Recommended grease; KS-650N, Shinetsukagaku)

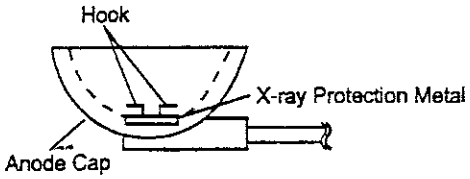


Do not paint inside of 10mm.



Over-painted area may be less than 5mm.

(3) Lock the hook inside of the Anode cap onto the Anode button and attach the X-ray protection metal onto the Anode button surely.



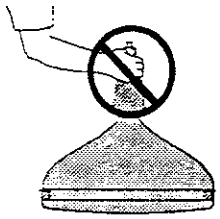
(4) Confirm that the Anode cap is completely stuck on the surface and any partial tearing or lifting of it should not be recognized.

(5) Confirm that the Silicone grease is painted 5mm beyond the Anode cap brim.

⚠ CAUTION

1) **Do not lift the CRT by the neck.**

The neck of the CRT is not firm enough to hold the entire CRT. Hold the CRT under your arms when lifting it. In case the CRT is dropped, it could result in injury.



2) **Be careful about the followings to keep the special coating for anti-static and good contrast.**

(1) Do not absorb the CRT surface with a vacuum absorption machine. It may damage the coating of the surface.

(2) Use a soft cloth to remove dust from the screen. If necessary, stubborn stains can be removed by moistening part of a cloth with water or alcohol (ethanol, methanol, or isopropyl alcohol) to enhance its cleaning power.

Never use cleaners including abrasives or bleacher.

(3) Do not scratch or press on the surface with any sharp objects, such as pencil or pen as this may result in damage to the CRT.

(4) When carrying the monitor, do not scratch or press on the surface with any sharp objects, such as pencil or pen as this may result in damage to the CRT.

(5) Do not paste any seals on the screen. It may make some marks because of the ultra violet rays.

(6) Never remove four aluminum foil tapes each corners of the screen. It may result in decrease the anti-static effect.

(7) Do not give any impact to the CRT. If you give the impact to the CRT when using the monitor on face top style, there are more internal sparks of CRT than TV style. The internal spark is caused by the coating inside of the CRT that comes off and drops to the guns. Therefore, the impact to the CRT on face top style causes frequent internal sparks and improper Cut Off adjustment of the CRT that makes the screen invisible and loses the white balance. Also, the screen disappears for a moment when the spark occurs.

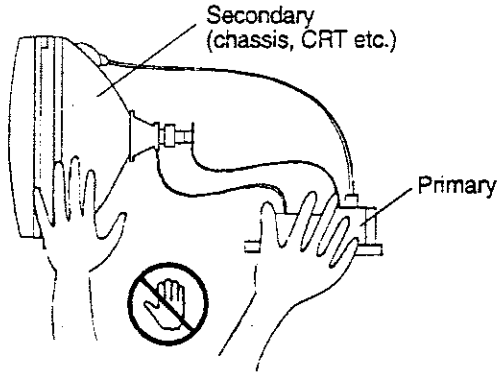
3. Electrical Circuit

⚠WARNING

1) <u>Do not touch the +B Voltage and High Voltage terminals inside the monitor.</u>

The circuits of the monitor is divided into the Primary part and Secondary part which both are insulated. Do not touch the Primary or the Primary and the Secondary at the same time. And do not short both parts. If carelessly contacted, it can cause serious shock or result in damage to the monitor.

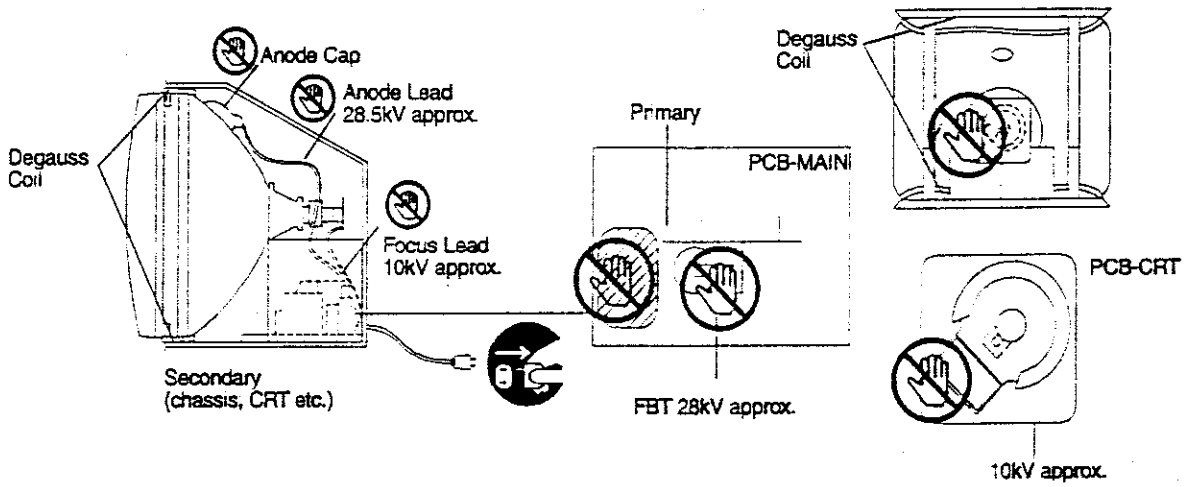
When adjusting, use some dielectric tools and do not touch any other volumes than adjustment ones.



2) <u>Do not touch the inside of the monitor when operating. There is a part generating high voltage more than 20000V inside of the monitor.</u>

If necessarily, unplug the power cord before touching.

If an object such as solder or paper falls into the monitor, unplug it immediately. It can cause smoke, electric shock or damage to the circuit.



3) **Do not operate the monitor with a High Voltage level exceeding the specified range below.**
Failures in the High Voltage Adjustment can increase X-ray radiation. The maximum High Voltage range specified for operating the monitor is as below.
Specified Power Supply : 100~120V, 220~240V, Beam Current : zero
High Voltage level : 28.0 ± 0.6 kV
To check for the presence of High Voltage, use an accurate high impedance High Voltage Meter connected between the Anode Button and the CRT dag.
It may cause a rise in the voltage when the Power Supply Voltage is out of the specifications range.

4) **Do not clamp the high voltage lead (the red lead from FBT) with any other leads.**
The high voltage or static electricity may cause an electric shock or damage to the circuit.

5) **Connect the coating earth to the PCB-CRT.**
Otherwise, it may cause an electric shock.

6) **Use 2 pin power plug of the Digital voltage meter.**
Otherwise, an electric shock, damage to the circuit or breaker-down may occur.

7) **When checking wave on the primary voltage line, use the 2-pin power plug of oscilloscope. Do not connect GND on the primary circuit and GND on the secondary circuit (chassis).**
If not, this may cause electric shock, damage to the circuit or breaker-down.

8) **Do not check on the primary and secondary voltage line with same oscilloscope at the same time. If necessary, connect the Isolation Transformer for the power of monitor.**
This may cause an electric shock or damage to the circuit.

4. Others

⚠ WARNING

1) <u>Take care not to scratch the coating of the Degauss Coil.</u>
Degauss Coil circuit is on the primary voltage line. When the coating of the Degauss Coil is damaged and the Coil directly touches the chassis or screws, the chassis voltage will become the same as the primary voltage line. This can result in hazardous danger as follows.

(1) Electric Shock
(2) Short (Current Leakage)
(3) Degauss does not work
(4) Circuit Damage
(5) Damage of connected computers or peripherals. It can result in a hazardous fire or electric shock. Follow the instructions below.

2) <u>**Do not bring any sharp objects such as the edge of the chassis close to the degauss coil, FBT, the anode lead and the focus lead.**</u>
This may cause an electric shock or damage to the objects connected.

⚠ CAUTION

1) If you touch the CRT surface, you may feel a slight electric shock. This is caused by the static electricity being produced on the CRT surface and it does not affect the human body.
2) When bringing one monitor close to another monitor, make sure the monitors' structure and setting. If one monitor has the different vertical frequency, another monitor image may flicker.
3) If you shift horizontal position of the monitor until a part of the displayed image disappears, the image may be dark. This is not problem for monitor reliability. Readjust to gain the best position.

●Before Returning to the Owner :

To protect your customers, perform the following safety checks before returning the monitor.

A. Observance

⚠WARNING

1) **Testing equipment should be isolated by putting an insulating board in between.**

When the back cabinet of the monitor is removed and the monitor is operating, there is a risk of an electric shock.

2) **Keep people away during the test.**

When the back cabinet of the monitor is removed and the monitor is operating, there is a risk of an electric shock.

3) **Do not wear any metal or accessories.**

There is a risk of an electric shock when the circuit is shorted.

B. Test Procedure

⚠DANGER

When any portion of the chassis is short-circuit caused by a leakage of primary voltage line, the conductive area may become high voltage which can result in an electric shock or other hazardous danger.

1) **Withstanding Voltage Check**

Impress AC voltage between a conductive chassis and the line of the AC cord for 1~2 seconds when the Main Power Switch is ON. The buzzer of the testing equipment should not be NG.

100~120V: 1200 VAC (Electric current sensitivity: 5mA)

C. Safety Checks

1) Check and see that all the connectors are tightly inserted.

2) Check and see that all the harness wires have been clamped as specified.

3) Check and see that any lead wires are not caught between the chassis and other metal parts in the monitor.

4) Check and see if the following important works for safety are surely performed.

- The VR721 (HV ADJ), VR711 (X-Pro) is surely locked with the silicone rubber after adjusting.
- The Anode Cap and the Anode Rings are surely equipped.

5) Check and see if the following important indications for safety are surely indicated.

- The Label-HV is surely indicated near the anode of FBT, the Focus and Screen Lead, the DY Lead and the anode of CRT.
- The Name Plate is surely put on the chassis.
- The Label-HV-Fuse, the Label-DHHS and the Label-PTB-2932 are surely indicated on the CRT or the chassis.